

[Document] Claims

[Claim 1]

A pedal reaction force applying apparatus for applying a predetermined pedal reaction force to a pedal member which is operationally depressed to be pivoted about a support axis, said apparatus being characterized by comprising:

a reaction-force applying device for applying said pedal reaction force to said pedal member and changing said pedal reaction force; and

a reaction-force controlling device for activating said reaction-force applying device such that said pedal reaction force is changed on the basis of a depressing stroke of said pedal member, according to a predetermined pattern of change of said pedal reaction force.

[Claim 2]

A pedal reaction force applying apparatus according to claim 1, characterized in that

said reaction-force applying device includes:

a spring member which is connected, at one of opposite ends thereof, with a predetermined connected portion of said pedal member that is distant from said support axis, and which is mechanically elastically deformed upon depression of said pedal member, for thereby applying said pedal reaction force to said pedal member; and

a reaction-force changing mechanism for changing said pedal reaction force, by displacing said one of said opposite ends of said spring member relative to said connected portion of said

pedal member, or by moving the other of said opposite ends of said spring member toward and away from said connected portion of said pedal member.

[Claim 3]

A pedal reaction force applying apparatus according to claim 2, characterized in that

said reaction-force changing mechanism includes a cam member which is pivotable about an pivot axis and which has an engaged portion whose distance from said pivot axis is continuously changed,

and wherein said engaged portion of said cam member is held in engagement with said other of said opposite ends of said spring member, so that said other of said opposite ends of said spring member is movable toward and away from said connected portion of said pedal member, by said engaged portion as a result of pivot motion of said cam member.

[Claim 4]

A pedal reaction force applying apparatus according to claim 2, characterized in that

said reaction-force changing mechanism includes a feed screw mechanism for linearly moving a spring seat which is held in engagement with said other of said opposite ends of said spring member, toward and away from said connected portion of said pedal member, by action of a screw.

[Claim 5]

A pedal reaction force applying apparatus according to any one of claims 1-4, characterized in that

said reaction-force controlling device includes a transmission mechanism which mechanically connects said pedal member with said reaction-force applying device, and which changes said pedal reaction force by mechanically activating said reaction-force applying device upon depression of said pedal member.

[Claim 6]

A pedal reaction force applying apparatus according to any one of claims 1-4, characterized in that

said reaction-force controlling device includes a stroke sensor for electrically detecting said depressing stroke of said pedal member, and an electronic controller for electrically controlling said reaction-force applying device on the basis of said depressing stroke of said pedal member detected by said stroke sensor,

and in that

said reaction-force applying device is equipped with a drive device for changing said pedal reaction force on the basis of a signal supplied from said electronic controller.

[Claim 7]

A pedal reaction force applying apparatus for applying a predetermined pedal reaction force to a pedal member which is operationally depressed to be pivoted about a support axis, said apparatus being characterized by comprising:

a cam member which is disposed in a predetermined position distant from said support axis and which is pivotable about its pivot axis that is parallel with said support axis, said

cam member having an engaged portion whose distance from said pivot axis is continuously changed;

a transmission mechanism which mechanically connects said pedal member with said cam member, and which mechanically pivots said cam member upon depression of said pedal member; and

a spring member which is interposed between said cam member and a predetermined connected portion of said pedal member that is distant from said support axis, said spring member being mechanically elastically deformed upon depression of said pedal member, for thereby applying said pedal reaction force to said pedal member, said spring member having an engaged end portion which is engaged with said engaged portion of said cam member and which is displaceable following a profile of said engaged portion of said cam member, for thereby changing said pedal reaction force applied to said pedal member.